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$4m+1$. All bisectors thus formed, will be the bisectors for 13 trapezoids.

List for 1885, giving the parallel sides.

No. 1.	65—1885—2665.
2.	377—1885—2639.
3.	593—1885—2599.
4.	667—1885—2581.
5.	719—1885—2567.
6.	965—1885—2485.
7.	1015—1885—2465.
8.	1085—1885—2385.
9.	1297—1885—2329.
10.	1363—1885—2291.
11.	1409—1885—2263.
12.	1537—1885—2171.
13.	1651—1885—2093.

List for 1105.

No. 1.	73—1105—1561.
2.	155—1105—1555.
3.	221—1105—1547.
4.	367—1105—1519.
5.	391—1105—1513.
6.	455—1105—1495.
7.	533—1105—1469.
8.	595—1105—1445.
9.	799—1105—1343.
10.	809—1105—1337.
11.	923—1105—1261.
12.	995—1105—1205.
13.	1057—1105—1151.

Observe that had the conditions, included "prime" then the four trapezoids only answering for 1885, are Nos. 3, 5, 9, and 11. For 1105, Nos. 1, 4, 10, and 13, as given above.

Solved under a slightly different conception by *G. B. M. Zerr*, and exhaustively discussed by *Hon. Josiah H. Drummond*, of Portland, Maine, in a paper which we expect to give later.

3. Proposed by *J. A. CALDERHEAD*, B. Sc., Superintendent of Schools, Lima, Ohio.

Given the simultaneous angular velocities of a body about the principal axes through its center of inertia, find the position of these axes in space at any assigned instant.

I. Solution by the Proposer.

Represent the axes, at first by α, β, γ ; and if q be the quaternion defined in § 372 (*Tait's Quaternions*), and $\omega_1, \omega_2, \omega_3$ (functions of the time) represent the angular velocities about the three axes in their new positions, we have obviously

$$2Vqq^{-1} = (e)q(\omega_1\alpha + \omega_2\beta + \omega_3\gamma)q^{-1}.$$

Integrating this gives q , and the axes are then $q\alpha q^{-1}, q\beta q^{-1}, q\gamma q^{-1}$.

II. Solution by *WILLIAM HOOVER*, A. M., Ph. D., Professor of Mathematics and Astronomy, Ohio University, Athens, Ohio.

Angular velocities are resolved and compounded as are linear velocities. If $\omega_1, \omega_2, \omega_3$ be the angular velocities designated in the problem, the resultant angular velocity is $\sqrt{\omega_1^2 + \omega_2^2 + \omega_3^2} = \omega$.

The direction cosines are $\frac{\omega_1}{\omega}, \frac{\omega_2}{\omega}, \frac{\omega_3}{\omega}$, determining the required positions.

PROBLEMS.

8. Proposed by *H. C. WHITAKER*, B. S., M. E., Professor of Mathematics, Manual Training School, Philadelphia, Pennsylvania.

Find a general expression for the (integral) co-ordinates of a triangle with sides of integral lengths.